

Remarks/Arguments:

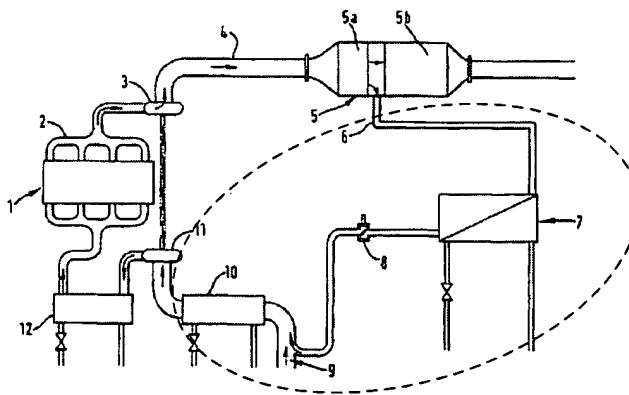
Claims 9-14 are pending. With this Response, claim 10 is amended. In accordance with the intent of MPEP § 706.07(a), the amendments to claim 10 include limitations which the Examiner should reasonable expect the applicant to make in response to the Office Action rejection under 35 U.S.C. § 112. Accordingly, the applicant requests entry of these amendments.

Rejection of Claim 10 under 35 U.S.C. § 112

The amendments to claim 10 clarify the structural features of the claimed exhaust system. The exhaust system has, as one of its components, an EGR system. The intake for the EGR system is configured to accept a portion of the exhaust gas from the exhaust system. That portion of the exhaust gas that does not flow into the EGR system passes to the next component of the exhaust system, the particulate filter. The applicant respectfully requests reconsideration of the rejection.

The Claimed Invention

For the convenience of the Examiner, a summary of the claimed invention is provided. Independent claim 9 is directed to an exhaust system. The exhaust system comprises at least three components: an oxidation catalyst 5a, a particulate trap 5b, and an exhaust gas recirculation (EGR) system (those components falling within the dashed oval) as illustrated in the altered Figure 1 of the application, reproduced below. (Figure 1 of the application does not have the dashed oval.)



The EGR system has its own individual components, one of which is the EGR system intake 6. The EGR system intake 6 is located at that point where the EGR system branches off from the main exhaust gas pipe. Figure 1 clearly illustrates an embodiment of the invention claimed in claim 9: The EGR system intake 6 is located downstream of the oxidation catalyst 5a (note the curved arrow representing exhaust flowing into the EGR system intake 6), and the particulate trap 5b is located downstream of the EGR system intake 6 (and, consequently, the oxidation catalyst 5a).

In sum, the claimed invention is directed to a diesel engine having an intake and comprising an exhaust system. The exhaust system in turn comprises three primary elements: (1) an oxidation catalyst; (2) a particulate trap; and (3) an EGR system. The exhaust system provides the main flowpath of exhaust gas as contemplated by the claim which specifies the relative positioning of the three main elements (for example, "the EGR system intake is located downstream of the oxidation catalyst"). Accordingly, each of the three primary elements of the claim are separate and apart from each other along the main flow path of the exhaust gas system and the claim does not contemplate a system in which one of the three components is a part of any other components.

Rejection of Claims 9-14 under 35 U.S.C. § 103(a)

1. Claims 9-14 stand rejected under 35 U.S.C. §103(a) as unpatentable over Allansson (U.S. Patent No. 6,427,436) in view of Paas (U.S. Patent No. 5,785,030)

The pending claims are not obvious in view of the art of record because A) the combination of references still fails to teach each and every limitation of the claimed invention, and B) the supplied motivation of mere design choice to combine the cited references is improper.

A. Each and Every Feature of the Claims are not Taught

The rejection alleges that Allansson et al. discloses all of the claimed features except for locating the particulate trap downstream of the EGR system intake. Paas is cited as disclosing a particulate trap located downstream of the EGR system intake. The motivation to re-arrange the components in Allansson et al. in view of Paas is because such a re-arrangement is no more than an obvious design choice, "and well within the knowledge of one skilled in the art so as to prevent soot dust from being stuck and deposited in the air intake port thereof." (Office Action, page 4).

The Office Action maintains that Paas does disclose a particulate filter (identifying reference numerals 20, 120, and 220 as the particulate filter) located downstream of the EGR system intake (identifying reference numeral 50 of Figs. 1, 4, and 5 of Paas).

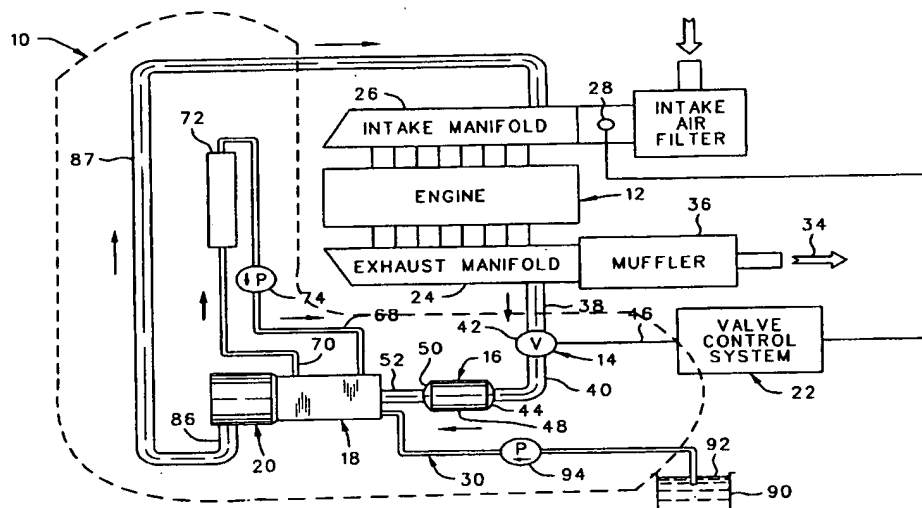


FIG. 1

The applicant respectfully traverses the rejection because the applicant submits that the characterization of Paas in the Office Action is incorrect. More specifically, the configuration of the exhaust system in Paas does not teach "an exhaust system [having] an oxidation catalyst; a particulate trap; and an exhaust gas recirculation (EGR) system" as three separate elements, which is required by claim 9.

In contrast to the claimed invention, Fig. 1 of Paas illustrates the exhaust system with only two components: 1) an EGR system 10 (which includes those components within the dashed line) and 2) a muffler 36. The EGR system in Paas "comprises an EGR valve assembly 14, catalyst assembly 16, heat exchanger assembly 18, and filter assembly 20." Col. 5, lines 47-49. Clearly, in Paas, filter 20 is not a component of the exhaust system separate and apart from the EGR system, but in fact, it is a component of the EGR system.

Moreover, the applicant notes that claim 9 also requires that "the EGR system intake is located downstream of the oxidation catalyst and the particulate trap is located downstream of the EGR system intake." This claimed location of the components of the exhaust system is not taught by Paas. The applicant submits that the Office Action erred in identifying the EGR system intake. Reference numeral 50 is not an EGR system intake. Col. 6, line 58 of Paas

clearly identifies reference numeral 50 as the outlet end of the catalyst can. Paas expressly identifies reference numeral 38 as the EGR intake, which is a logical location. Reference numeral 38 is at a location where the EGR system pipe branches off from the main exhaust pipe. At this position, the EGR system intake is clearly upstream of catalyst assembly 16, heat exchanger assembly 18, and filter assembly 20. Accordingly the combination of Allansson et al. and Paas et al. does not teach or suggest all the claim limitations. Therefore, Paas does not disclose an exhaust system and its orientation of the exhaust system components as claimed in the present invention.

Allansson et al. is acknowledged as failing to teach a particulate trap downstream of an EGR system intake. As shown above, Paas also fails to teach an exhaust system with the claimed components and configuration. For at least the reason that the combination of Allansson et al. and Paas fail to teach all the features of the claimed invention, the pending claims are not rendered obvious by the art of record. Withdrawal of the rejection is respectfully requested.

B. Design Choice as the Motivation to Combine the References is Improper

The Office Action cites to *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950) as standing for the proposition that it is obvious to merely rearrange the order of parts. In *In re Japikse*, the claims were directed to a hydraulic power press which read on the prior art except with regard to the position of the starting switch. The claims were held unpatentable because shifting the position of the starting switch would not have modified the operation of the device. Thus, from the holding of *In re Japikse*, the question of whether the rearrangement of parts is a mere design choice is whether the rearrangement would modify the operation of the device. Applying this test to the present case, the question becomes: Does the rearrangement of placing the filter downstream of the EGR system intake modify the operation of the device in Allansson et al.?

This question should be answered in the affirmative. First, the fact the Allansson et al. is silent regarding the criticality of the position of the filter with respect to the EGR system intake. The applicant submits that because of this silence, ANY rearrangement, particularly the position of the EGR system and the filter, would modify the operation of Allansson et al.

Furthermore, the particular rearrangement of the present invention was chosen as a design suited to overcoming the disadvantage of the pressure drop experienced by exhaust

gases passing through the filter prior to entering the EGR system, as occurs in the arrangement disclosed in Allansson et al. This pressure drop is significant, because in order to return exhaust gas to the air intake side, a pressure differential is required between the exhaust and the intake manifold without which EGR would not flow from the former to the latter. By sourcing the EGR from upstream of the filter, the problem of pressure differential is reduced, thus improving design options.

Previously it had been thought that since the caustic and sticky "wet" particulate matter comprising solid carbon soaked in a volatile organic fraction could cause excessive valve wear and malfunction in EGR systems that the arrangement disclosed in Allansson et al. was the only arrangement suited to use with diesel engines, especially heavy duty diesel engines. However this problem was overcome when the present inventor found that it is the combination of solid carbon and the volatile organic fraction in "wet" particulate matter that causes the valve problems, and that by removing the hydrocarbon fraction, thereby forming "dry" particulate matter, such problems are reduced or avoided. Therefore by inserting the EGR system intake between the oxidation catalyst and the particulate trap the hydrocarbon fraction is removed by catalysis, only "dry" particulate matter reaches the EGR system intake, and the exhaust gases entering the EGR system do not experience a pressure drop.

For this additional reason, withdrawal of the rejection is respectfully requested.

2. Claims 9-14 stand rejected under 35 U.S.C. §103(a) as unpatentable over JP 08-338320 or JP 09-88727 in view of JP 06-066208 in view of Allansson et al.

As discussed above, claim 9 requires "wherein the EGR system intake is located downstream of the oxidation catalyst and the particulate trap is located downstream of the EGR system intake" and claim 14 requires "recycling a portion of the gas that passed through the oxidation catalyst to an engine intake; trapping particulates from the remaining portion of the exhaust gas that is not recycled in a filter which is mounted downstream of where the portion of the exhaust gas is recycled." None of the cited Japanese references or Allansson et al., individually or combined, disclose or suggest such a claimed arrangement. Moreover, the supplied motivation to combine the Japanese references with Allansson et al. because such is a mere duplication of the essential working parts of a device is improper.

A. Each and Every Feature of the Claims is not Taught

Figs. 1, 2, 4-8, and 10 of JP 08-338320 show particulate filter 19 located within EGR system passage 16. Fig. 9 shows the EGR system passage 16 located downstream of both the oxidation catalyst and the particulate filter 19. In either configuration (shown in Fig. 9 or in Figs. 1, 2, 4-8, and 10), JP 08-338320 teaches that it is necessary to have the particulate trap before or within the EGR system so that the exhaust gases flowing back to the engine have a reduced particulate fraction. Paragraph [0008].

Figs. 1, 2, 4-6, and 8 of JP 09-88727 show particulate filter 22 within the EGR system. Fig. 7 shows the EGR system passage 58 located downstream of both the oxidation catalyst 21 and the particulate filter 22.

The only Figure of JP 06-066208 clearly shows the oxidation catalyst and particulate filter located within the EGR system. As discussed above, a filter within the EGR system is not the same as a particulate trap as a component of the exhaust system. As acknowledged by the Office Action at page 3, Allansson et al. fails to disclose a particulate trap located downstream of an EGR system intake. Thus, the combination of the Japanese references and Allansson, even if properly combined, still fails to disclose each and every feature of the claimed invention. Withdrawal of the rejection is respectfully requested.

Furthermore, if one of ordinary skill in the art were to move the EGR system intake of JP 08-338320 or JP 09-088727 in line with the teaching of Allansson et al. they would not produce a system in which the EGR system intake is located between the oxidation catalyst and the particulate trap (as is presently claimed) but instead downstream of both the oxidation catalyst and the particulate trap. Equally, if one of ordinary skill in the art were to move the particulate filter of Allansson et al. in line with the teaching of JP 08-338320 or JP 09-088727 they would not produce a system in which the EGR system intake is located between the oxidation catalyst and the particulate trap (as in the present invention), but instead upstream of both the oxidation catalyst and the particulate trap. Since neither of the combinations of JP 08-338320 or JP 09-088727 with Allansson et al. would result in the arrangement as claimed, the claims are not rendered obvious by this combination of references.

If JP 06-066208 were combined with Allansson et al., the result would be an exhaust system comprising two sets of oxidation catalyst and particulate trap (as discussed on page 8 of the non-final Office Action). One for the EGR system and another for the exhaust gases being

emitted to atmosphere. For the rejection to be proper, one would first have to modify JP 06-066208 to only use a single exhaust system, or then input that single system into Allansson. There is no express or implied motivation in either of the cited references or within the knowledge of a person of ordinary skill in the art to do so. In addition, since the arrangement of the particulate trap and the oxidation catalyst within the EGR system would be that of JP 06-066208, the particulate trap within the EGR system would be upstream of the catalyst therefore preventing the particulate trap from being regenerated by the NO₂ produced by the catalyst (as discussed on page 3, lines 24-30).

Because none of the cited references, individually or combined, teach or suggest the features of claims 9 and 14, the applicant respectfully requests withdrawal of the rejection.

B. Mere Duplication Of The Essential Working Parts Of A Device
As Motivation Is Improper

The rejections states that the motivation to combine the teachings of the Japanese references with Allansson et al. would be a mere duplication of the essential parts of the device, and as such, obvious to do so. First, the claimed invention does not duplicate essential parts of a device found in the art. Second, the applicant fails to understand how duplicating parts provides motivation to combine the teachings of the Japanese references with Allansson et al. For these reasons alone, the motivation to combine the references is in error and no *prima facie* case for obviousness has been made. Withdrawal of the rejection is respectfully submitted.

Moreover, as discussed in the present application (see page 2, lines 3-8 and page 2, lines 18-27) and contrary to the Examiner's assertion, JP 08-338320 and JP 09-088727 are not suited to heavy duty diesel applications.

JP 09-088727 discloses the use of a cooler downstream of the EGR control valve, and JP 08-338320 makes no mention of a cooler. Both JP 08-338320 and JP 09-088727 also disclose that the EGR control valve is upstream of the catalyst and particulate filter. Under the higher operating temperatures associated with heavy duty diesel applications this means that the EGR valve is exposed to caustic and sticky "wet" particulate matter comprising solid carbon soaked in a volatile organic fraction (see earlier, part 1, section B).

Accordingly the combination of Allansson et al. with any one of JP 08-338320, JP 09-088727 or JP 06-066208 does not teach or suggest all the claim limitations.

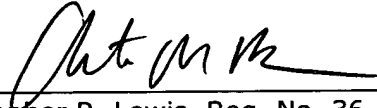
Double Patenting Rejection of Claims 9-14 under 35 U.S.C. § 103(a)

As discussed above, the combination of Allansson in view of Paas et al. fails to teach or suggest all the features of the claimed invention. For at least the same reasons as discussed above, the applicant respectfully requests withdrawal of the double patenting rejection.

IV. Conclusion

Claims 9 and 14 require an "exhaust system [with] an oxidation catalyst; a particulate trap; and an exhaust gas recirculation (EGR) system." None of the cited references, as argued above, either alone or in combination, teach or suggest such an exhaust system. Withdrawal of the rejections is respectfully submitted.

Respectfully submitted,



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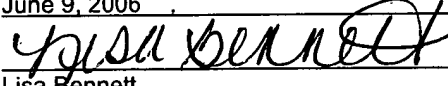
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